

Efficient Land and Water Management
According to the Royally-initiated

NEW THEORY



By

Office of the Royal Development Projects Board



His Majesty the King

During a Royal Visit to Observe the Operations of
The Royally-initiated Wat Mongkol Chaipattana
Area Development Project

At Chalerm Phra Kiet District, Sara Buri Province

“Original Model of the New Theory”

On 25th January 1993

THE NEW THEORY

Preface

From past to present, a shortage of water supply for agricultural activities has been a major problem facing Thai farmers. The impact is severe for the agricultural areas which rely heavily on rainwater. Unfortunately, such areas where there is little precipitation constitute a predominant part of the country with mostly rice and field crop farming being implemented. Such a condition limits farmers from carrying out their cultivation to only once a year during the rainy season. Moreover, farmers were exposed to high risks and damage due to adverse environmental conditions of the soil, climate, and inconsistent rainfall patterns. Although efforts have been made to counter water shortage problems, for example by digging ponds to store water, appropriate sizes or systems have never been determined. There were still other factors which magnified the shortage of water such as unsystematically planned crop cultivation or monocropping farming systems.

Aware of the situation, His Majesty King Bhumibol Adulyadej graciously set up an initiative to relieve the farmers from sufferings and guide them through the plight of water scarcity, with minimal impacts and pain.

His Majesty's ingenious solution was named the "New Theory" it serves as a set of principles or guidelines on the proper management of land and water resources to create optimum benefits for farmers who own a small piece of land.

The New Theory: A Novelty in Agriculture

1. The concept involves management that requires a division of a small piece of land into well-defined parts so that farmers will receive optimum benefits from efficient land utilization, an unprecedented strategy.

2. It entails technical calculations to determine a sufficient supply of water for all year cultivation.

3. The idea provides individual farmers with a comprehensive plan that consists of three phases.



New Theory Phase I

Definition of Residential and Farming Areas

The scheme requires dividing the land into four parts with a ratio of 30:30:30:10 as follows:

– *Part 1:* About 30% is designated for a pond which is used to store rainwater during the rainy season, supply crop cultivation during the dry season, and raise different aquatic animals and plants.

– *Part 2:* About 30% is set aside for rice cultivation in the rainy season which will provide sufficient yields for daily consumption all year round, thus enabling each family to cut down expenses and become self-reliant.





– *Part 3:* About 30% of the total area will be used to grow fruit and perennial trees, vegetables, field crops, herbal plants and the likes which provide for daily consumption and the surplus can be sold.

– *Part 4:* About 10% of the remaining land is allocated for housing, raising animals, and for other activities.



Office of the Royal Development Projects Board

Main Principles and Important Guidelines

1. The main idea of the New Theory is to serve as a production system that allows farmers to become self-sufficient, self-reliant, and frugal. To be viable, this concept requires unity and willingness of the community to work with and assist one another in order to reduce expenses, similar to the traditional practice of **Long Khaek** (traditional mutual help gathering for an activity such as rice harvests).

2. With rice being the staple food for every Thai household, the theory estimates that, if each family carries out rice cultivation over an area of 5 rai (1 rai = 0.4 acre), they will be guaranteed with a whole year's supply of rice for consumption. This means that farmers will not have to buy rice at an unreasonably high price and can lead their lives freely because they have become self-reliant.



3. Another important point is that the storage of water must be sufficient to supply farming during the dry season or dry spells. Therefore, the concept ensures that a part of the land is set aside for the construction of a pond to store sufficient water for an all year round cultivation. His Majesty provided the guideline that for one rai cultivation, a farmer will need about 1,000 cubic metres of water. Thus under the New Theory, if an area of 5 rai is used for rice farming and another 5 rai for field or fruit crop farming (a total of 10 rai), approximately 10,000 cubic metres of water will be needed annually.

Therefore, under the assumption that each piece of land has a total area of 15 rai, a formula has been derived for farmers to apply on their plots as follows:

- an area of 5 rai for rice cultivation.
- an area of 5 rai for field and garden crops cultivation.
- an area of 3 rai for a pond with a depth of 4 metres and a storage capacity of 19,000 cubic metres, which is a sufficient amount to supply farming and other daily needs during the dry season.
- an area of 2 rai for housing and other activities.
- total area of 15 rai.

In any case, a decision about the size of the pond should be made based on the local geographical and environmental conditions as follows.

- If the implementation plot is located in an area which depends on rainfed, then the pond should be dug quite deep in order to prevent evaporation, thus allowing all year water supply.

- If the implementation plot is located in an area which depends on an irrigation system, then features of the pond can be flexible, in terms of the depth, shallowness, or width. It only needs to consider the local suitability because with an irrigation system, a water replenish source is secured.

The purpose of having a pond is simply to allow farmers an all year water supply for their occupation and consumption usages. His Majesty referred to it as a "regulator", implying that a well-defined water replenish cycle system has been established to support farming all year round, particularly during the drought and dry spell periods. However, this does not mean that farmers can cultivate Na Prang rice (an off-season rice farming). If the water in the pond is insufficient, it is then necessary to pump water from an existing nearby dam, thus depleting the amount of water that has been stored in the dam. It is recommended for farmers to cultivate rice during its regular season, that is in the rainy period. And during the dry season, farmers must consider other suitable types of crop to cultivate in order to use the stored water both efficiently and optimally.



- In the rainy season, water will be plentiful for rice and other crops cultivation.

- During drought or dry spell periods, it is most suitable to cultivate crops that do not require large amount of water, such as beans.

4. For this scheme to divide the land in order to produce optimum benefits, His Majesty based His calculations on the fact that each farmer owns an average land area of 15 rai. However, the following plan is not a fixed formula but simply a guideline in which farmers who own more or less this amount of land can adjust the 30:30:30:10 ratio.



- First 30%: pond area (farmers can raise fish and aquatic plants like convulvulus, water mimosa etc.) in which a chicken coop can be built
- Second 30%: rice farming
- Third 30%: field and garden crop plantation (fruit trees, perennial trees for multi-purpose uses or housing, field and garden crops, herbal plants etc.)
- Last 10%: housing and other activities (roads, earth dikes, straw stacks, a sundry area, a composting area, nursery, a mushroom house, an animal stall, a floral and decorative plant nursery, backyard garden crops etc.)

In any case, the described ratio only serves as a recommended formula or as a guideline. Adjustments of the ratio can and should be made to suit each area's local characteristics such as the soil characteristics, the amount of rainfall, and the general environment. For instance, in the southern region where rainfall is more plentiful or in areas where sources of water are available to continuously replenish the pond, it will be possible to reduce the size of the pond and allocate the surplus land for more useful purposes.

New Theory Advanced Phase



Once farmers understand the principles and apply the preliminary steps described in Phase I successfully, they can then proceed to improve their living status in becoming self-sufficient; to cut down most of the expenses; and to be free from the external constraints. And to accomplish greater productivity, it is necessary to follow the steps in Phase II and III respectively as follows.

New Theory Phase II

Once farmers have grasped the overall concept and successfully implemented Phase I which produced satisfactory outcome, it is time to begin Phase II. The second phase suggests that farmers pool their efforts, resources, and will in the form of a group or a cooperative to execute the following activities.

(1) Production (crop selection, soil preparation, irrigation system etc.)

- In this aspect, farmers have to work together in the production which includes soil and source of water preparation, crop varieties selection, fertilizer production, and other factors necessary for cultivation.

(2) Marketing (sundry area, silo, rice mill, product distribution etc.)



- Once they have produced the yields, the next step is for farmers to make the necessary preparations in order to optimize marketing and selling of their produce. These activities include provision of a central rice-drying area, a silo to gather the rice yields, and a rice mill as well as grouping to sell their produce at a satisfactory price which, in the process, also reduces their expenses.

(3) Well-being (food, clothing etc.)

- Farmers also need to have a decent living standard which equips them with the basic needs of life such as food and clothing.

(4) Welfare (public health services, loans etc.)

- Each community should offer security and needed services such as a public health station or funds established to provide loans to carry out the community's activities.





(5) Education (school, scholarships etc.)

- The community should play a dominant role in promoting the pursuit of education for example by establishing a fund to support the education for youth.

(6) Society and Religion

- The community will serve as a tool for social and moral development with religion as a welding component.

All the above-mentioned activities require complete cooperation from everyone concerned, be it the government agencies or the private sector, and equally important, members of that community.



New Theory Phase III

After Phase II, individual farmers or groups of farmers would then proceed to Phase III which involves making the necessary contacts and coordinating to establish a fund or ensure funding from credit sources such as banks or companies, in order to assist them in the investment for activities that improve the quality of their lives.

Under such arrangements, both farmers and the credit sources will receive mutual benefits as follows:

- Farmers can sell their rice at a higher price (without being suppressed in terms of the price they want in exchange for the products).

- Credit sources can buy rice at a lower price (since they buy directly from farmers and mill the paddy by themselves).

- Farmers can obtain consumer goods at a low price because they can buy in bulk (by operating like a cooperative store and having the privilege of buying commodities at a wholesale price).

- Credit sources can dispatch their personnel to various locations to implement different activities which guarantee for better results.

Benefits

From His Majesty's royal speeches given on various occasions, the benefits of the New Theory can be summarized as follows:

1. The New Theory enables the people to lead a 'sufficient' life which is economical, unscathed by privation and hunger, in line with the theory of 'self-sufficient economy'

2. Despite a lack of water during the dry season, cultivation of crops and even rice can be feasible without having to rely on irrigation because the water stored in the farm pond can be utilized.

3. In a year with plenty of seasonal rainfalls, the New Theory can generate high income and consequently, enhance wealth.

4. In case of flooding, farmers can recover from the damage and depend on themselves at a certain level of sustenance without having to rely on too much assistance from the government. This helps to save the national budget.





Essential Considerations

1. The implementation of the New Theory must take into account various factors and be adjusted consistent with the environmental conditions of each locality. Therefore, farmers are instructed to request advice from the concerned officials.

2. It should be ensured that the pond to be dug can store water and the soil must be suitable to grow crops. Some types of soil are not suitable for agriculture such as loose soil and sandy soil which cannot retain water, and peat soil and saline soil which are unproductive. Therefore, the difference in the topographical conditions of the area should be carefully considered and useful advice from the officials in charge of soil development or from other concerned officials should be sought.





3. The land area on which the New Theory should be implemented was calculated by His Majesty in consideration of the average land ownership which is approximately 15 rai per household. However, the size and proportional management of the land (30:30:30:10) is not fixed. If the farmer owns a larger or smaller piece of land, this proportion can be adjusted.

4. The integration of multiple cropping (for example, cultivation of rice as a primary crop, mixed with cultivation of vegetables, fruit crops, field crops and herbal plants as secondary crops) with fishery and animal husbandry enables farmers to obtain harvests all year round. This not only helps to reduce household food expenditures but also creates supplementary income for the family.

5. Cooperation at the communal level, by *Long Khaek* or the traditional gathering to help one another in an activity, e.g. during a rice harvest, is an important force for the implementation of the New Theory. This not only promotes affection and unity in the community itself but also reduces costs to be incurred for labour employment.

6. The digging of the pond results in a lot of surplus soil that can be used for many purposes. The topsoil, which is a fertile part, should be used later in the cultivation of various crops by spreading it over lower and unfertile layers of soil or on raised beds along the edges of the ponds or fields.



Restrictions or Problems of Implementation



Restrictions or problems which may arise in the implementation of the New Theory are stressed in the excerpt from His Majesty's speech given on December 4, 1995, as follows:

" . . . The implementation of the New Theory is not simple. It has to depend on the area, opportunity as well as budget. Since a wide scale of people has learned of the benefits of the New Theory, they want to implement it on their own land by requesting assistance from the government to dig a pond and for other matters. But this is not easy. In some areas, when a pond is dug, it is found to be lacking water completely. In other areas, despite abundant rainfall, the water cannot be retained because there is a leakage. Moreover, in worse cases, the New Theory cannot be implemented at all because the land is not situated in a catchment area, thus disabling storage of water. Importantly, the New Theory also requires a suitable area. Therefore, the adoption of the New Theory or, in other words, the provision of a water supply for farmers is not simple, but it needs mutual assistance. . ."

Recommended Types of Crops and Animals for Farming

Fruit trees and perennial plants : mango, coconut, tamarind, jackfruit, sapodilla, orange, banana, custard apple, papaya, santol, sesbania, horseradish, neem tree, cassod tree, lead tree etc.

Short-lived vegetables and flowers : sweet potato, taro plant, yard long bean, eggplant, jasmine, Aztec, globe amaranth, rose, *Calotropis*, tuberose etc.

Mushrooms : nang-fah mushroom (*Pleurotus sajor-caju*), straw mushroom, abalone mushroom (*Pleurotus cystidiosus*) etc.

Herbs and spices : areca palm, betel pepper, pepper, elephant yam, *Centella asiatica*, ebony tree, ringworm bush, vetiver grass, as well as certain types of crops such as holy basil, common basil, mint, basilicum, lemongrass etc.

Wood and firewood : bamboo, coconut, palm, camachile, combretum, coral tree, siris, lead tree, eucalyptus, neem tree, cassod tree, *Pterocarpus*, *Dalbergia*, *Dipterocarpus alatus* etc.





Field crops : maize, soybean, groundnut, cowpea, pigeon pea, sugarcane, cassava, castor, kapok etc. Some types of field crops could be harvested when they are still young and sold in the market because they can get better prices than when they are ripe. Such types of crop are maize, soybean, groundnut, cowpea, pigeon pea, sugarcane, cassava etc.

Soil nourishing and ground cover crops : pigeon pea, Carribean stylo, African sesbania, sesbania, sunhemp, sword bean, cassod tree, lead tree, green pea etc. And after they have been harvested, the soil can be ploughed and turned over to further nurture the soil.

It must be noted that many plants provide more than one benefit. Emphasis in plant selection should be on perennial plants because they do not need intensive care once they are fully grown; while their products are obtained all year round if different types of plants have been selected. These perennial trees will provide shade and moisture to the living area and the environment. Not only that, it is necessary to consider the area's natural characteristics. For instance, eucalyptus should not be planted around the edges of the pond, instead, trees that yield fruits would be more suitable.

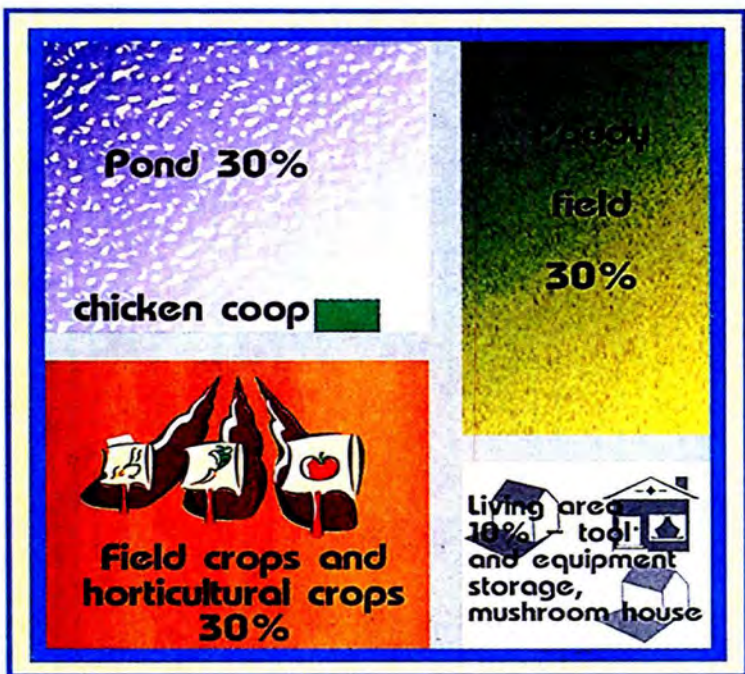


Other Types of Animals

1. Aquatic animals such as common carp, Nile tilapia, common silver barb, and catfish will provide protein supplements and can also be sold to earn additional income. In some areas, frogs can also be bred.

2. Pigs or chickens are raised along the edges of the pond. In this case, pig and chicken dung may be used for fish and duck feed.

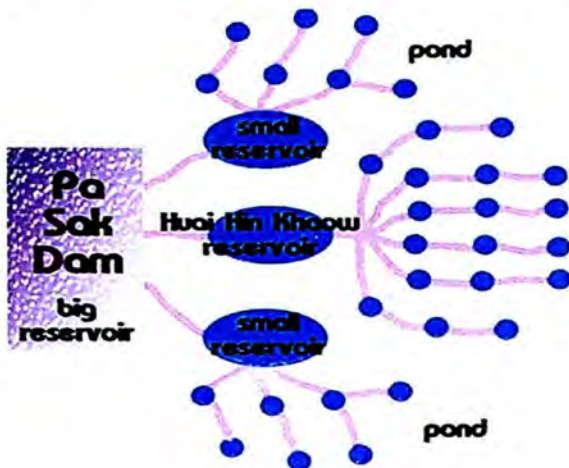
*Demonstration Plot for Land Allocation
Under the Principles of the New Theory*



A Complete New Theory

Implementation of the New Theory that depends on rainwater is considered inefficient and risky because in some years, there may not be plenty of rain to store enough water. In order to complete the New Theory the pond must be able to store water effectively and at an optimal capacity. There should be a substantial water source, from which the water in the pond could always be replenished. An experiment with this principle can be observed at Wat Mongkol Chaipattana, Sara Buri Province, where His Majesty the King graciously granted the following guidelines.

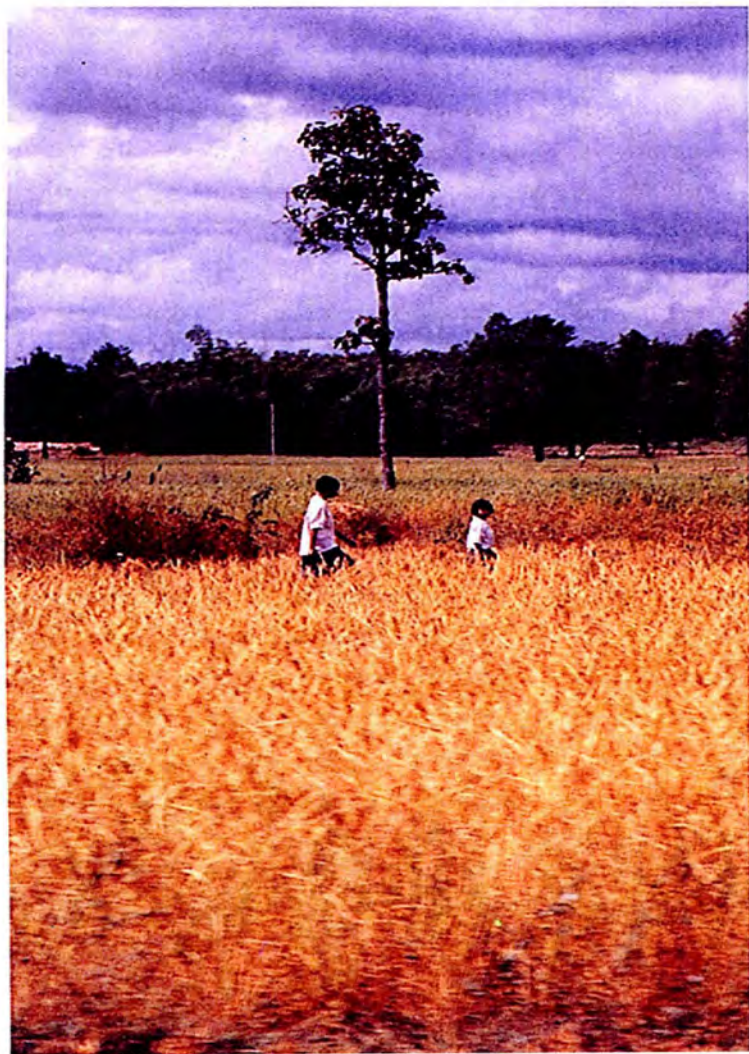
The complete system of the New Theory: A big reservoir supplies a small reservoir; a small reservoir supplies a pond.



In the figure small circles are ponds which farmers dig according to the principle of the New Theory. During the dry season, farmers can pump water from the pond and in case the water supply is insufficient, water can be transferred from the Huai Hin Khaow reservoir (small reservoir) through the constructed water delivery system. Therefore, farmers will have enough water to use all year long.

In case the farmers have used up a large amount of water, the Huai Hin Khaow reservoir (small reservoir) may not have enough water. If there exist big projects that have been completed, such as the Pa Sak Development Project, water can be drained from the big reservoir to Huai Hin Khaow reservoir (small reservoir). With this method, the farmers will have enough water in their ponds throughout the year.

This new concept of His Majesty the King in managing water resources by installing water delivery pipelines connecting to the cultivation plots increases the water supply for farmers by 3-5 times. This way, in the rainy season, water can be stored in both the constructed large reservoir as well as in the farmers' ponds. Hence, the amount of water supply increases tremendously and the reservoir will only serve as a water replenish source for the ponds.



*Important Details and Contact Addresses for
the New Theory Demonstration Plot*

Those who are interested in adopting the New Theory in practice and are capable of adhering to the guidelines under the theory can seek information and advice as well as observe the New Theory Demonstration Plot at the following locations.

1. Office of the Royal Development Projects Board
(Office of the RDPB) or The Chaipattana Foundation

Contact : Public Relations Division

Tel. 280-6193-200 Fax. 280-6206

2. Royally-initiated Wat Mongkol Chaipattana Area
Development Project, Chalem Phra Kiet District, Sara Buri Province

Contact : Director of the Phra Phuthabat Field
Crops Experimentation Station

Tel. (036) 499-181

3. Khao Hin Sorn Royal Development Study Centre,
Phanom Sarakam District, Chachoengsao Province

Contact : Director of the Centre

Tel. (038) 599-105

4. Royally-initiated Khlong Si Siad Reservoir Development
Project, Pak Phlee District, Nakhon Nayok Province

Contact : Chief of Pak Phlee District

Tel. (037) 399-657

Manager of the Khlong Tha Dan Dam
Project

Tel. (037) 313-574

5. Huai Sai Royal Development Study Centre,
Cha-am District, Phetchaburi Province

Contact : Director of the Centre

Tel. (032) 471-110

6. Kung Krabaen Bay Royal Development Study
Centre, Tha Mai District, Chanthaburi Province

Contact : Director of the Centre

Tel. (039) 369-216-8

7. Puparn Royal Development Study Centre, Muang
District, Sakon Nakhon Province

Contact : Director of the Centre

Tel. (042) 712-975

Director of the Sakon Nakhon Field Crops
Experimentation Station

Tel. (042) 711-008

8. Baan Dan Samakkee New Theory Demonstration
Project, Khao Wong District, Kalasin Province

Contact : Chief of Khao Wong District

Tel. (043) 859-089

9. Royally-initiated New Theory Demonstration Project,
Pak Thong Chai District, Nakhon Ratchasima Province

Contact : Director of the Baan Mai Samrong Field
Crops Experimentation Station

Tel. (044) 325-048

10. Huai Hong Khrai Royal Development Study Centre,
Doi Saket District, Chiang Mai Province

Contact : Director of the Centre

Tel. (053) 246-402

11. Pikun Thong Royal Development Study Centre,
Muang District, Narathiwat Province

Contact : Director of the Centre

Tel. (073) 513-560

12. Provincial and district offices throughout the country

13. Provincial and district agricultural offices throughout
the country

14. Research and agricultural development offices,
research centres, and the Department of Agriculture's experiment
stations located throughout the country

New Theory : Do's and Don'ts

<i>Do's</i>	<i>Don'ts</i>
<ol style="list-style-type: none">1. Adjust the calculated ratio namely 30:30:30:10 to suit the local topographical and environmental conditions.2. Have to grow rice sufficient for the household consumption all year round.3. Study the soil condition for its ability to detain water and consult officials before digging a pond.4. Transfer topsoil from digging the pond to fill the cultivation area.5. Utilize the empty area around the house for horticulture and herbal plants cultivation in order to reduce the household expenses for food.6. Raise livestock which is complimentary to each other such as chickens, ducks or pigs around the pond or housing area.7. Raise fish in the pond, not only for protein consumption but also for selling in the market to supplement the family's income.8. Grow vetiver grass around the pond to prevent erosion of earthen embankments.9. Create unity among local people by jointly working together as <i>Long Khaek</i> to realize successful outcomes.10. Consult officials of Department of Land Development, Department of Agriculture, Royal Irrigation Department, Department of Agriculture Extension, chiefs of district, district and subdistrict agricultural officials and other offices concerned.	<ol style="list-style-type: none">1. Do not think that the application of the New Theory is impossible if agricultural area owned is more or less than the assumed 15 rai; the ratio scheme can be adapted to suit the actual size of land owned.2. Do not hesitate to set aside a part of land for constructing a pond; and if there is an existing pond, it is not necessary to dig a new one, just improve the pond to be able to store water.3. Do not destroy the rich topsoil while digging a pond.4. Do not cultivate plants or perennial trees which need much water around the pond edges.5. Do not practise monocropping.6. Do not change to practise New Theory if the current farming activity is working out well.7. Do not follow the concept if the area is not suitable for practising the New Theory. Try to find other suitable way of farming to suit the local condition.8. Do not be discouraged and lazy.

Long Khaek - Traditional mutual help gathering for an activity such as rice harvests.



Application of the New Theory is not that simple.
It depends on the area and opportunity
in addition to the budget availability.
Nowadays, the public are well informed
about the New Theory.

Royal Statement

Granted on 4th December 1995



**“...Application of the New Theory...
must be carried out with flexibility,
like when we carry out our lives...”**

**Royal Statement Granted on 14th January 1998
At Hual Sai Royal Development Study Centre,
Cha-am District, Phetchaburi Province**